

REMARKS

Claims 1, 3, 4, and 6-14, are all the claims pending in the application. Reconsideration and allowance of all the claims are respectfully requested in view of the following remarks.

Election / Restriction

Claims 7-12 previously were withdrawn as being directed to a non-elected invention. However, these claims have been amended to depend from claim 4, which is directed to the elected invention. Accordingly, claims 7-12 should now be examined with the elected invention of Group I.

Claim Rejections - 35 U.S.C. § 112

The Examiner rejected claims 13 and 14 under §112, 1st paragraph, as containing subject matter not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that he inventors had possession of the claimed invention. Specifically, the Examiner asserts that the original specification does not appear to describe the non-metallic inclusion formed in the rolling member as being greater than 0.01 mm. Applicants respectfully traverse this rejection for the following reasons.

First, Fig. 5 shows exemplary breaking time for different sizes of defect. As seen in Fig. 5, there is a marked decrease in breaking time (i.e., bearing life expectancy) when the size of the defects (non-metallic inclusions) rises above 0.115 mm. Further, the specification as originally filed describes a toroidal-type continuously variable transmission component comprising a rolling member made of steel and having a layer formed near the surface thereof, wherein the layer does not contain non-metallic inclusions having a maximum diameter of 0.115 mm or more. See, for example, page 4, line 24 - page 5, line 4. But Fig. 5 also shows a scale that goes to a defect size of 0 mm, i.e., there would be no defects. Therefore, one of ordinary skill in the art would appreciate that defects all the way to 0 mm can be included within the scope of the invention. Alternatively, however, Applicants also disclose that a defect detecting apparatus using ultrasonic waves having high frequencies such as 50-150 MHz, can only detect a defect to

0.01 mm. See page 3, lines 20-26. Accordingly, Applicants should be allowed to claim a lower limit of 0.01 mm in connection with the size of the defect.

The Examiner rejected claims 13 and 14 under §112, 2nd paragraph, as indefinite.

Specifically, the Examiner asserted that it is unclear whether the term “a non-metallic inclusion”, as set forth on line 2 of these claims, references the inclusion defined in claims 1 and 4, respectively. Applicants respectfully traverse this rejection because the claims are definite as written.

For example, claim 1 does not necessarily set forth a non-metallic inclusion. Instead, claim 1 sets forth that “the layer does not contain a non-metallic inclusion having the maximum diameter of 0.115 mm or more.” That is, a layer having no inclusions would meet the above-noted language of claim 1. On the other hand, dependent claim 13 specifically requires that there be “a non-metallic inclusion” disposed within the layer.

Further, the Examiner asserts that the phrase “between greater than”, as set forth on line 3, is awkwardly worded, and suggests changing the phrase to “between”. Applicants have adopted the Examiner’s suggestion, which in fact broadens the scope of the claims.

In light of the above, claims 13 and 14 are definite as written.

Claim Rejections - 35 U.S.C. § 102

The Examiner rejected claims 1, 3, 4, and 6, under §102(e) as being anticipated by US Patent 6,113,514 to Okubo et al. (hereinafter Okubo). Applicants respectfully traverse this rejection because Okubo fails to disclose every element as set forth in Applicants’ claims.

Claim 1 sets forth a toroidal-type continuously variable transmission component comprising a rolling member made of steel and having a layer formed at 0.4 mm or less from the surface, wherein the layer does not contain a non-metallic inclusion having the maximum diameter of 0.115 mm or more, wherein the size of non-metallic inclusions in said layer is measured in said continuously variable transmission component. For example, in one embodiment of the invention, as described from page 12, line 22 to page 13, line 20, the component 2 of the CVT—for example, a disk or a power roller—is the test piece actually used for determining the size of the defects.

Similarly to claim 1, claim 4 independently sets forth that the size of the non-metallic inclusions in a layer is measured in the CVT component.

In contrast to that set forth in each one of claims 1 and 4, Okubo—as shown in Figs. 12 and 13—discloses that a raw material, or a specimen (test piece) cut from the raw material, is used for detection of the non-metallic inclusion size. Okubo does not teach the determination of non-metallic inclusion defect size in the machined part of the CVT. And this difference is important.

The detected result in a raw material, as taught by Okubo, would be different from that in an almost completed part—i.e., a machined part such as a CVT disk, or a power roller—according to the present invention. Because the detection is done under an almost complete condition in the present invention, the detected result is more precise than that detected by Okubo. If detection of defect size is conducted in the almost completed condition, as in the present invention, it becomes possible more surely to prevent the existence of non-metallic inclusions adjacent to the surface of a CVT component.

In light of the above, Okubo fails to anticipate claims 1 and 4. Likewise, Okubo fails to anticipate dependent claims 3 and 6.

Claim Rejections - 35 U.S.C. § 103

The Examiner rejected claims 13 and 14 under §103(a) as being unpatentable over Okubo. Applicants respectfully traverse this rejection because Okubo fails to establish *prima facie* obviousness in that it does not teach or suggest every element as set forth in Applicants' claims.

Again, each of claims 1 and 4 independently sets forth that the size of the non-metallic inclusions in the layer is measured in the CVT component. As noted above, Okubo fails to disclose this element.

The Examiner asserted that it would have been obvious to manufacture a rolling member with non-metallic inclusions of 0.015 mm in order to reduce the manufacturing costs of the rolling member. But the Examiner does not set forth a convincing line of reasoning as to why it would have been obvious to one of ordinary skill in the art to modify Okubo so as to measure the

size of the non-metallic defects in a CVT component as opposed to in a test piece or in a raw material. Accordingly, even if one of ordinary skill in the art were motivated to modify Okubo as suggested by the Examiner, any such modification of Okubo would still not render obvious Applicants' claims 1 or 4.

The Examiner rejected claims 1, 3, 4, and 6, under §103(a) as being unpatentable over US Patent 5,855,531 to Mitamura et al. (hereinafter Mitamura) in view of Japanese Reference 06-287710 to Kawatetsu (hereinafter JP '710). Applicants respectfully traverse this rejection because the references fail to establish *prima facie* obviousness in that they do not teach or suggest every element as set forth in Applicants' claims.

Again, each of claims 1 and 4 independently sets forth that the size of the non-metallic inclusions in the layer is measured in the CVT component. As noted above, such a CVT component is more precise than the CVT's disclosed in the cited art.

In contrast to that set forth in Applicants' claims, Mitamura is silent as to the detection of the non-metallic inclusions, whereas JP '710 detects the size of non-metallic inclusions in the raw material or in a test specimen cut from the raw material.

In light of the above, Mitamura and JP '701 fail to render obvious Applicants' claims 1 or 4. Likewise, dependent claims 3 and 6 are not rendered obvious by Mitamura in view of JP '701.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Amendment Under 37 C.F.R. § 1.111
US Appln. 09/617,310

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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Twice Amended) A toroidal-type continuously variable transmission component comprising:

a rolling member made of steel and having a layer formed at 0.4 mm or less from the surface thereof,

wherein the layer does not contain a non-metallic inclusion having the maximum diameter of 0.115 mm or more,

wherein the size of non-metallic inclusions in said layer is measured in said continuously variable transmission component.

4. (Twice Amended) A toroidal-type continuously variable transmission component comprising:

a rolling member made of steel and having a layer formed at 0.5 mm or less from the surface thereof,

wherein the layer does not contain a non-metallic inclusion having the maximum diameter of 0.1 mm or more,

wherein the size of non-metallic inclusions in said layer is measured in said continuously variable transmission component.

7. (Amended) A method for evaluating a toroidal-type continuously variable transmission component having [a] the steel rolling member according to claim 4, said method comprising:

disposing a desired surface of said rolling member to be measured and an ultrasonic detection probe within an ultrasonic wave transmissive medium;

transmitting an ultrasonic wave, having a frequency in the range of 5 MHz - 30 MHz, from said ultrasonic detection probe to said rolling member through said ultrasonic wave transmissive medium; [and]

detecting and evaluating a non-metallic inclusion existing in the area of 0.5 mm or less from said desired surface of said rolling member in accordance with an ultrasonic echo reflected by said rolling member; and

disqualifying said rolling member when the thus detected non-metallic inclusion has the maximum diameter of 0.1 mm or more.

13. (Amended) The toroidal-type continuously variable transmission component according to claim 1, further comprising a non-metallic inclusion disposed within said layer, wherein said non-metallic inclusion has a maximum diameter of between [greater than] 0.01 mm and [less than] 0.115 mm.

14. (Amended) The toroidal-type continuously variable transmission component according to claim 4, further comprising a non-metallic inclusion disposed within said layer, wherein said non-metallic inclusion has a maximum diameter of between [greater than] 0.01 mm and [less than] 0.1 mm.